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CHAPTER 13

The Associative–Propositional Evaluation Model

Operating Principles and Operating Conditions of Evaluation

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Conflicting evaluative responses to the same object, individual, or social group can be vexingly commonplace in everyday life (Conner & Armitage, 2008). For example, we may experience spontaneous apprehension and discomfort when encountering members of stigmatized groups even though we intellectually abhor prejudice and wish to express solidarity with minorities. Analogously, people can feel a strong romantic attraction toward another person despite firmly believing that this person is not a good match. Although these two examples are quite distinct, both are characterized by a conflict between spontaneous evaluative responses and deliberate evaluative judgments. One valuable approach to studying such evaluative conflicts is to compare people's responses on traditional self-report measures (e.g., attitude scales, likability ratings) to their responses on performance-based paradigms (e.g., Implicit Association Test, sequential priming). Conceptually, deliberate evaluative judgments on the former type of measures can be described as *explicit evaluations* in the sense that their evaluative meaning is explicit in the observed response (e.g., participants explicitly report their agreement or disagreement with an evaluative statement about an attitude object). Conversely, spontaneous evaluative responses on the latter type of measures can be described as *implicit evaluations* in the sense that their evaluative meaning is implicit in the observed response (e.g., evaluative responses are inferred from participants' latencies in responding to positive and negative words that are preceded by brief presentations of an attitude object). Over the past years, a substantial body of research has documented the possibility of dissociations between implicit and explicit evaluations, including different antecedents, different consequences, and discrepant evaluations of the same object.

The main goal of the current chapter is to review the core assumptions of our associative–propositional evaluation (APE) model, which explains dissociations between implicit and explicit evaluations in terms of their underlying mental processes (Gawronski & Bodenhausen, 2006a, 2006b, 2007, 2011). Whereas implicit evaluations are assumed to be the behavioral outcome of *associative processes*, explicit evaluations are conceptualized as the behavioral outcome of *propositional processes*. By making specific assumptions about mutual interactions between associative and propositional processes, the APE model implies a wide range of predictions about the conditions under which implicit and explicit evaluations show either converging or diverging patterns of responses. These predictions and relevant empirical evidence are extensively reviewed elsewhere (Gawronski & Bodenhausen, 2011), and we therefore refrain from providing elaborate discussions of these aspects in this chapter. Instead, we focus on how the distinction between associative and propositional processes relates to the distinction between automatic and controlled processes that has shaped dual-process theorizing for the last three decades (see Gawronski & Creighton, 2013). Our central argument is that the associative–propositional distinction refers to the principles that define *what* a particular process is doing. In contrast, the automatic–controlled distinction refers to empirical claims about *when* that process is operating. Although the two dichotomies are sometimes assumed to overlap, the APE model draws a sharp line between operating principles and operating conditions (Gawronski & Bodenhausen, 2007, 2009). In this spirit, we first explain the defining features of associative and propositional processes and then outline the manner in which the two processes are assumed to operate in an automatic versus controlled fashion. To resolve some common misconceptions about the APE model, we also address the difference between our dual-process distinction in terms of associative and propositional processes and cognate conceptualizations in terms of dual systems and dual representations.

OPERATING PRINCIPLES

As we noted earlier, the associative–propositional distinction refers to the operating principles that define what a given process is doing. In the APE model, we specify *associative processes* as the activation of mental associations on the basis of feature similarity and spatiotemporal contiguity; *propositional processes* are defined as the validation of momentarily activated information on the basis of logical consistency. These general definitions can be further specified on the basis of whether they refer to the expression or the formation of evaluative representations.

Expression of Evaluative Representations

A central assumption in research on attitudes is that encountering a stimulus can elicit a positive or negative response by activating stored evaluative representations in memory. In the APE model, we assume that principles of similarity matching determine the activation of mental concepts that represent the encountered stimulus (e.g., Afrocentric features of a face activating the concept *African American*), which can spread to other concepts that are associatively linked with the stimulus (e.g., activation of the concept *African American* spreading to the associated stereotypical attribute *hostile*). To the extent that the associated concepts have a positive or negative connotation, their activation is assumed to produce a spontaneous gut response that is in line with the valence of these concepts (*implicit evaluation*).

An important aspect of the similarity matching principle is that stimuli do not have to be perceptually identical across time and contexts to elicit the same evaluative response. Instead, configurations of input stimuli that pass a critical threshold of similarity are sufficient to activate the same mental representation (Smith, 1996). For example, relatively Afrocentric facial features can activate black stereotypes even when they are present in the faces of individuals who are categorized as white (Blair, Judd, & Fallman, 2004). In addition, the principle of similarity matching implies that even unknown stimuli can elicit spontaneous evaluative responses to the extent that they resemble a previously encountered stimulus with a stored evaluative representation. For example, unknown individuals may elicit a spontaneous positive or negative response by virtue of their resemblance to people we know (Gawronski & Quinn, 2013).

Another important aspect of the similarity matching principle is that associative activation is not an all-or-none process, such that encountering a given object would activate each and every concept that is associated with that object in memory. Instead, objects tend to activate only a limited subset of associated concepts. Which subset of associated concepts is activated in response to a given object is assumed to depend on the overall configuration of input stimuli, including both the target object and the context in which it is encountered. For example, encountering a black person in a jazz bar may activate the stereotypical attribute *musical*, whereas the same black person may activate the stereotypical attribute *criminal* if that person is encountered in a dark alley (for a review, see Gawronski & Sritharan, 2010). Hence, an attitude object may elicit distinctly different implicit evaluations depending on the particular context in which it is encountered. However, the activation of associated concepts is not entirely context-driven, because it is constrained by the preexisting structure of mental links in memory. After all, different contexts can modulate the activation of concepts in response to a given object only if these concepts are part of the mental representation of that object.

A central feature of associative activation is that it is independent of subjective truth or falsity. Specifically, we assume that the principles of similarity matching determine the activation of associated concepts regardless of whether the activated link is considered valid or invalid. For example, encountering a Muslim-looking man may activate the concept *terrorism* even if a person rejects the implied connection between Muslims and terrorism (Devine, 1989). According to the APE model, the validity of activated links is determined by a process of propositional validation. Specifically, we assume that activated information is regarded as valid unless the default process of affirming the validity of activated information produces an inconsistent set of beliefs. The central idea underlying these assumptions is that although consistency does not guarantee accuracy, inconsistency is an unambiguous indicator of an erroneous component in one's system of beliefs (Gawronski, 2012). In such cases, the momentarily considered set of information needs to be updated, which involves a reassessment of the validity of each component.

With regard to evaluative responses, we assume that the affective gut reactions resulting from associatively activated concepts are translated into the format of a propositional statement (e.g., a negative affective reaction toward object *X* is transformed into propositional statements such as "I dislike *X*" or "*X* is bad"). To the extent that the propositional evaluation implied by an affective gut response is consistent with other momentarily considered propositions, it may be endorsed in a verbal evaluative judgment (*explicit evaluation*). If, however, the overall set of momentarily considered propositions is inconsistent, the inconsistency has to be resolved to avoid aversive feelings of dissonance (Festinger, 1957). In general, propositional evaluations of a given object may be assessed for their consistency with (1) nonevaluative propositions about states of affairs and (2) propositional evaluations of other attitude objects (Jones & Gerard, 1967). To the extent that a set of momentarily considered propositions is inconsistent, consistency may be restored either by rejecting one of the involved propositions (i.e., reversing the subjective truth value of that proposition) or by searching for an additional proposition that resolves the inconsistency (Gawronski & Strack, 2004). For example, the propositional implication of a negative affective reaction to minority members (e.g., "I dislike African Americans") may be inconsistent with the propositional evaluation of another attitude object (e.g., "Negative evaluations of disadvantaged groups are wrong") and nonevaluative propositions about states of affairs (e.g., "African Americans are a disadvantaged group"). Thus, the inconsistency between the three propositions may lead to a rejection of the negative affective reaction as a valid basis for an evaluative judgment (e.g., "I like African Americans"). However, consistency may also be restored by rejecting either the nonevaluative proposition about states of affairs (e.g., "African Americans are not a disadvantaged group") or the propositional evaluation of another relevant attitude objects (e.g., "Negative evaluations of disadvantaged groups are okay."). Whereas the former case should result in a dissociation between implicit and explicit evaluations, the two kinds of evaluations should show converging negative responses in the latter cases (Gawronski, Peters, Brochu, & Strack, 2008).

In addition to such "bottom-up" effects of associative on propositional processes, the APE model also includes specific assumptions about "top-down" effects of propositional thinking on associative processes. Specifically, we assume that processes of propositional reasoning can influence associative processes by activating new information in the course of validating activated information. For example, if people are motivated to believe in the validity of a particular proposition, they may engage in a selective search for information that supports the validity of that proposition (Kunda, 1990). In such cases, biased retrieval of information from memory can activate associated concepts of a particular valence, which produces correspondence between implicit and explicit evaluations in a top-down fashion (Peters & Gawronski, 2011a).

An important factor in such top-down effects is whether propositional reasoning involves an affirmation or negation of the relevant information. Specifically, we argue that merely negating a particular proposition (i.e., reversing its truth value) is insufficient to deactivate the associative link underlying this proposition. In fact, negations often lead to ironic effects, such that the activation level of the underlying association is enhanced rather than reduced (e.g., Gawronski, Deutsch, Mbirkou, Seibt, & Strack, 2008). For example, negating the proposition "old people are bad drivers" may enhance the associative link between the concepts *old people* and *bad drivers*, thereby leading to a dissociation between implicit and explicit evaluations (Deutsch, Gawronski, & Strack, 2006). This situation is different if processes of propositional reasoning involve an affirmation of new information. For example, affirming the proposition "old people are good drivers" may strengthen the association between the concepts *old people* and *good drivers*, thereby increasing the correspondence between implicit and explicit evaluations. Thus, if a person is motivated to hold a positive (negative) impression of an attitude object, but experiences a negative (positive) affective reaction toward that object, the individual may engage in a directed memory search to retrieve positive (negative) information about the object, which should promote a positive (negative) evaluation for both explicit and implicit evaluations. If, however, the positive (negative) impression is maintained by merely negating the negative (positive) evaluation implied by the affective gut response (i.e., without retrieving supportive positive or negative information), explicit and implicit evaluations should show a dissociation, such that explicit evaluations reflect the desired positive (negative) evaluation, whereas implicit evaluations should reflect the original negative (positive) response.

Formation of Evaluative Representations

Before an evaluative representation can be activated, it has to be formed on the basis of some kind of learning experience. In the APE model, we distinguish between two conceptually distinct processes of forming evaluative representations depending on whether they are based on associative or propositional principles. Drawing on our general definition of associative processes, *associative learning* can be specified as the formation of associative links between mental concepts on the basis of observed spatiotemporal contiguities. The central assumption underlying this definition is that observed co-occurrences between objects and events result in a coactivation of their corresponding mental concepts, which in turn creates an associative link between the two. Repeatedly observing the same co-occurrences strengthens this link, which facilitates the spread of activation from one concept to the other upon encountering one of the two associated stimuli. An illustrative example of associative learning is *evaluative conditioning* (EC; see De Houwer, Thomas, & Baeyens, 2001), in which repeated pairings of a conditioned stimulus (CS) with a positive or negative unconditioned stimulus (US) can produce a mental association between the CS and the US in memory. As a result, subsequent presentations of the CS spread to the representation of the US, which produces an evaluative response to the CS that is in line with the valence of the US (e.g., Walther, Gawronski, Blank, & Langer, 2009).

In contrast to the associative principle of mere coactivation, *propositional learning* is defined as the formation of evaluative representations on the basis of propositional information that is regarded as valid. This definition is based on our conceptualization of propositional processes as being concerned with the validity of momentarily activated information. Propositional learning may be based on new information that is presented in the format of propositional statements (e.g., persuasive arguments asserting the quality of a consumer product). Alternatively, propositional learning can be based on propositional inferences about observed stimulus events in the environment (e.g., co-occurrences between stimulus events can trigger propositional inferences about their causal relation). Whereas the former case involves the acquisition of externally provided propositional information, the latter case involves the acquisition of self-generated propositional information. Yet, in both cases, the new information has to pass a process of propositional validation. This validity assessment is equivalent to the one involved in the expression of evaluative representations, such that new propositional information may be regarded as either true or false depending on its consistency with other momentarily considered propositions.

Although associative and propositional learning represent distinct mechanisms of forming evaluative representations, their outcomes are assumed to interact in a manner that is similar to the mutual interactions in the expression of evaluative representations. First, associatively formed representations may provide the input for propositional inferences, implying a bottom-up effect of associative on propositional processes. Thus, whether or not the evaluation implied by an associatively formed representation is regarded as valid depends on the consistency of this evaluation with other momentarily considered propositions (e.g., Gawronski & LeBel, 2008). Second, propositional processes may influence associative processes in a "top-down" fashion when externally provided or self-generated propositions create new mental links in memory (e.g., Whitfield & Jordan, 2009). As we outlined earlier, an important determinant of such top-down effects is whether the involved inferences entail an affirmation or negation of the relevant information. Whereas the affirmation of a given proposition should create an evaluative representation that is in line with the meaning of that proposition, negating a given proposition is claimed to have ironic effects.[1]

An important aspect of the distinction between associative and propositional learning is that the same stimulus event may influence evaluative representations through two simultaneously operating processes (Gawronski & Bodenhausen, 2006a). For example, repeated co-occurrences of a CS and a valenced US may create a mental link between the two stimuli through processes of associative learning. At the same time, the observed co-occurrences may provide the basis for self-generated propositions about their evaluative meaning (e.g., propositional inferences about the CS being a cause of the positive or negative event represented by the US), which may influence the evaluative representation through processes of propositional learning. This distinction is important, because it qualifies the conceptual equation of *evaluative conditioning* and *associative learning* that we endorsed in the initial presentation of the APE model (for a more detailed discussion, see Gawronski & Bodenhausen, 2011). To the extent that EC can be defined as the change in the evaluation of a CS due to its pairing with a valenced US (De Houwer, 2007), EC effects may be the result of either associative or propositional learning (e.g., Gawronski, Balas, & Creighton, in press). Yet a theoretical challenge is to identify the conditions under which the effect of observed co-occurrences on evaluative responses is mediated by associative or propositional learning (or both). This question pertains to the operating conditions of associative and propositional processes, which we discuss in the following section (cf. Gawronski & Bodenhausen, 2007, 2011).

OPERATING CONDITIONS

Whereas the associative–propositional distinction refers to the operating principles that define *what* a particular process is doing, the automatic–controlled distinction refers to empirical claims about *when* that process is operating (e.g., when there is no conscious awareness; when there is no intention to start the process; when cognitive resources are reduced; when there is a goal to alter or stop the process; see Bargh, 1994). According to the APE model, there is no one-to-one mapping between operating principles and operating conditions, such that associative processes would operate automatically, whereas propositional processes operate in a controlled fashion (Gawronski & Bodenhausen, 2009). Instead, both associative and propositional processes have automatic and controlled aspects. Moreover, each type of process involves different components, which require separate consideration in a thorough analysis of operating conditions. Because different features of automatic processing need not co-occur, we also deem it important to distinguish between the unique roles of awareness, intentionality, efficiency, and controllability (see Table 13.1). Impor-

TABLE 13.1. Overview of Associative and Propositional Process Components in the Formation versus Expression of Evaluative Representations and the APE Model's Assumptions about Their Operating Conditions (i.e., Awareness, Intentionality, Efficiency, Controllability).

		Awareness	Intentionality	Efficiency	Controllability
			Formation		
Associative learning	Formation of mental representations on the basis of observed spatiotemporal contiguities	Independent of conscious awareness	Unintentional, although antecedents may involve intentional exposure to particular contiguities	Efficient, although attentional distraction may undermine encoding of contiguities	Uncontrollable, although effects of associative learning can be concealed by processing goals
Propositional learning	Formation of mental representations on the basis of propositional information that is regarded as valid	Dependent on conscious awareness	Unintentional storage possible in the absence of memorization goal	Mere consideration of proposition efficient, although comprehension may require more resources when information is complex	Controllable through invalidation, although limited to propositional level
			Expression		
Associative activation	Activation of mental concepts through similarity matching and spread of activation	Experiential awareness of affective gut responses; processes and mental concepts that give rise to affective gut responses can be unconscious	No intention required, although intentional activation possible	Efficient, although effortful activation possible	Controllability depends on adopted control strategy (i.e., affirmation vs. negation)
Propositional validation	Default affirmation of the validity of activated information	No awareness required, although conscious reassessment of validity possible	No intention required, although intentional reassessment of validity possible	Efficient, although effortful reassessment of validity possible	Controllable through negation of validity
	Monitoring (in)consistency between activated information	No awareness required, although conscious monitoring possible; inconsistency raises conscious awareness	No intention required, although intentional monitoring possible	Required resources depend on amount of information and complexity of inferences	Uncontrollable
	Resolution of inconsistency between activated information	Reassessment of activated information involves conscious awareness of processing steps (e.g., reversal of truth value, search for information that resolves inconsistency)	Intentional	Required resources depends on amount of information and complexity of inferences	Controllable through change in preferred strategy to resolve inconsistency
	Report of outcome of validation process	Conscious	Intentional	Efficient	Controllable

tantly, whereas the distinction between associative and propositional processes is purely conceptual, any claims about their operating conditions are empirical and therefore have to be assessed on the basis of relevant evidence.

Awareness

Expression

Conscious awareness is commonly defined in terms of introspective access to mental processes or mental contents. Empirically, lack of introspective access can be established through participants' inability verbally to report a mental process or mental content. In the APE model, we argue that people usually have *experiential access* to their affective gut reactions resulting from associatively activated concepts, and that they often rely upon these reactions in making propositional evaluative judgments. Still, people also sometimes reject their affective gut reactions as a basis for an evaluative judgment when these reactions are inconsistent with other momentarily considered propositions. However, such dissociations between affective gut reactions and evaluative judgments do not imply that the affective gut reactions are introspectively inaccessible.

Note, however, that although people may be experientially aware of the affective gut reactions resulting from activated associations, they may sometimes be unaware of the processes that gave rise to these reactions (Gawronski, Hofmann, & Wilbur, 2006). For example, people may show a positive or negative gut response toward an unfamiliar individual on the basis of that person's similarity to a known individual. However, they may not be able to identify the similarity between the two individuals as the cause of their affective gut response (e.g., Günyadin, Zayas, Selcuk, & Hazan, 2012). In terms of the APE model, such effects can be explained by the principle of similarity matching that characterizes the process of associative activation. In this example, the resemblance between the two individuals may activate evaluative concepts that are associated with the known individual, thereby eliciting an affective gut response that is in line with the valence of these concepts. Yet the particular content of these associations may remain unconscious even when people are experientially aware of the affective gut reaction resulting from these associations. In other words, people may be experientially aware of their affective gut reactions to a person or object, but they may sometimes be unaware of the particular associations that are responsible for these reactions.

As for propositional processes, we assume that conscious awareness is not required for the default process of affirming the validity of activated information, although people may sometimes engage a conscious reassessment of the validity of that information. Similar considerations apply to the process of monitoring the consistency of momentarily activated information. In many cases, this monitoring process may operate outside of conscious awareness, even though people can certainly monitor their belief systems consciously to identify potential inconsistencies. However, inconsistency between activated information is assumed to raise conscious awareness, which in turn supports the resolution of inconsistency (Morsella, Zarolia, & Gazzaley, 2012). In such cases, the necessary reassessment of the activated information involves conscious awareness of the involved processing steps, such as the negation (i.e., reversal of the truth value) of a particular proposition or the search for information that resolves the inconsistency. The behavioral process of reporting an evaluative judgment generally occurs under conscious awareness.

Formation

Associative learning is commonly assumed to be independent of people's awareness of the relevant contiguities that are responsible for the formation of new associative links. The APE model generally agrees with this contention. Yet several studies found that EC effects were smaller (e.g., Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010) or fully attenuated (e.g., Pleyers, Corneille, Luminet, & Yzerbyt, 2007) when participants failed to remember the relevant CS–US pairings. These findings have led some researchers to reject the hypothesis that observed CS–US contiguities can influence evaluative representations through an unconscious process of associative learning (e.g., Mitchell, De Houwer, & Lovibond, 2009). However, there are a number of methodological issues that have to be taken into account when interpreting the relation between memory performance and evaluation. First, it is important to note that current approaches to measure memory for CS–US pairings confound effects of contingency memory and conditioned attitudes, thereby biasing results in favor of the conclusion that contingency memory is a necessary precondition for EC effects. If the confounded influences are disentangled by means of process dissociation (Jacoby, 1991), EC effects tend to emerge even in absence of contingency memory (Hütter, Sweldens, Stahl, Unkelbach, & Klauer, 2012). Second, although memory measures are certainly suitable to investigate the contribution of propositional knowledge of CS–US relations to EC effects at the time of expressing an evaluative response, they remain ambiguous about the role of conscious awareness during the formation of an evaluative representation (Gawronski & Walther, 2012). This ambiguity is due to the fact that (1) memory measures are unable to distinguish between encoding-related and retrieval-related effects, and (2) the relation between memory performance and evaluation is merely correlational, which limits conclusions about causal relations between memory performance and EC effects. As a result, any possible data pattern can be interpreted in at least two different ways, which undermines the suitability of memory measures to investigate whether evaluative learning can occur outside of conscious awareness. As outlined in detail by Gawronski and Walther (2012), a stringent test of this hypothesis requires experimental approaches in which awareness of CS–US pairings is manipulated during encoding.[2] To be sure, memory measures can be very useful to study the contribution of propositional knowledge to EC effects at the time of expressing an evaluative response (e.g., Balas & Gawronski, 2012). However, such influences should not be confused with unconscious influences of CS–US pairings at the time of forming an evaluative representation.

Whereas associative learning is assumed to be independent of conscious awareness, propositional learning generally requires conscious awareness. This hypothesis is based on evidence that externally provided propositional statements cannot be encoded outside of awareness (Baars, 2002; Greenwald, 1992). What is usually extracted from a propositional statement under suboptimal processing conditions is the presence of individual stimuli and their co-occurrence, but not the propositional meaning of the statement. Similarly, conscious awareness is assumed to be required for the self-generation of propositions in response to stimulus events. Of course, to the extent that people are consciously aware of the contiguity of two stimuli, associative and propositional learning may jointly influence the evaluative representation of these stimuli (e.g., Gawronski et al., in press). Yet lack of conscious awareness should eliminate the effects propositional learning, leaving associative learning as the only mechanism that can produce representational changes.

Intentionality

Expression

In general terms, a process can be described as *unintentional* if it is instigated in the absence of a person's intention to start that process (Bargh, 1994). Applied to evaluative responses, it has been argued that the activation of evaluative associations—and therefore the affective gut reactions resulting from these associations—occurs regardless of the intention to evaluate an object (e.g., Bargh, Chaiken, Raymond, & Hymes, 1996). In line with this contention, the APE model assumes that the activation of evaluative associations in memory can indeed occur unintentionally, thereby meeting the second criterion of automaticity. However, it is important to note that evaluative associations can also be activated intentionally. For example, an individual may intentionally search for particular information in memory, and the evaluative associations that are activated through this search may influence this person's affective responses to the relevant target object (e.g., Peters & Gawronski, 2011a). Thus, even though the activation of evaluative associations—and therefore the affective gut reactions resulting from these associations—does not require intention, evaluative associations can also be activated intentionally.

As for propositional processes, we argue that intention is not required for the default process of affirming the validity of activated information, even though individuals may sometimes engage in an intentional reassessment of the validity of that information. Similar to our assumptions about awareness, we assume that such intentional reassessments will occur when the overall set of activated information is inconsistent. In such cases, people will intentionally restore consistency by either negating (i.e., reversing the truth value of) a particular proposition or by searching for information that resolves the inconsistency. In addition, we argue that the monitoring of (in)consistency occurs unintentionally (Morsella et al., 2012), even though people may sometimes engage in an intentional assessment of the consistency of their beliefs. The behavioral process of reporting an evaluative judgment is generally intentional.

Formation

Associative learning can be described as *unintentional* in the sense that the learning process itself does not require the goal to form a new association. However, associative learning can certainly have intentional antecedents, such that people may intentionally expose themselves to repeated co-occurrences to facilitate their acquisition (e.g., intentional exposure to pairs of words in the learning of a foreign language).

Similar considerations apply to propositional learning. Once an externally provided or self-generated proposition is considered, its content may be stored in memory even when people do not have the goal to memorize it. Of course, the goal to memorize the content of a given proposition may facilitate its storage, but such a goal is not a necessary precondition. In fact, a substantial body of evidence suggests that alternative processing goals (e.g., impression formation) can be more effective in producing a strong memory trace than memorization goals (e.g., Hamilton, Katz, & Leirer, 1980). The same is true for the process of self-generating a new proposition, which also does not require an intention to instigate this process. Although self-generated propositions can certainly be the result of intentional inferences about stimulus relations, they can be purely "stimulus-driven" in the sense that they spring from activated associations when people unintentionally notice a systematic relation between stimuli.

Efficiency

Expression

A process can be described as *efficient* if it operates even under conditions of reduced cognitive resources. Applied to evaluative responses, it is commonly assumed that evaluative associations are activated in response to a particular stimulus even when cognitive resources are scarce. The APE model generally agrees with the contention that associative processes are highly efficient. However, this efficiency does not imply that evaluative associations cannot be activated in an effortful manner. Even though evaluative associations—and therefore the affective gut reactions resulting from these associations—do not require cognitive effort to become activated, they can also be activated through the effortful retrieval of evaluative information from memory (e.g., Peters & Gawronski, 2011a).

As for propositional processes, we argue that the default process of affirming the validity of activated information is highly efficient in the sense that it occurs even under conditions of reduced cognitive resources. However, the situation is different for the monitoring and the resolution of inconsistency. In many situations, the monitoring of momentarily activated information may occur efficiently through the unconscious and unintentional operation of the brain's conflict monitoring system (Botvinic, Cohen, & Carter, 2004). However, when people engage in a conscious and intentional assessment of particular pieces of information, limits in working memory capacity will constrain (1) how much information they can hold simultaneously in memory and (2) the complexity of syllogistic inferences they can perform to assess the consistency of this information. To the extent that the amount of relevant information is rather small and the complexity of the required inferences is low, the identification and resolution of inconsistency will require few cognitive resources (e.g., Richter, Schroeder, & Wöhrmann, 2009). If, however, the amount of relevant information is large or the required inferences are relatively complex, the cognitive resources that are required for the identification and resolution of inconsistency will be more substantial (e.g., Martinie, Olive, & Milland, 2010). In other words, we do not assume that propositional processes are cognitively effortful per se. Rather, processes of propositional reasoning can be more or less effortful depending on the complexity of the inferences that are involved. For example, high levels of complexity are often involved when motivational concerns bias the direction of propositional reasoning, in that people engage in an elaborate search for information that validates a desired conclusion or invalidates an undesired conclusion (e.g., Moreno & Bodenhausen, 1999). The behavioral process of reporting the outcome of these validation processes usually requires few cognitive resources. What does require more cognitive resources is the mental process of reaching an evaluative conclusion, not the behavioral process of reporting that conclusion.

Formation

According to the APE model, the formation of mental links through associative learning is resource-independent, although attentional distraction may sometimes disrupt associative learning if it undermines the encoding of the relevant contiguities (e.g., Pleyers, Corneille, Yzerbyt, & Luminet, 2009). Thus, when investigating the proposed resource-independence of associative learning, we deem it important to distinguish between different aspects of working memory capacity (see Baddeley, 2010). Whereas capacity constraints on episodic memory (e.g., concurrent rehearsal of a complex digit-string) should leave associative learning unaffected, capacity constraints on perceptual processing (e.g., concurrent attention to numbers in a two-back task) may reduce the effects of associative learning to the extent that it undermines the perceptual encoding of the relevant stimulus contiguities (see also Custers & Aarts, 2011; Field & Moore, 2005).

As for propositional learning, we assume that the mere consideration of a given proposition does not require substantial amounts of cognitive resources, although greater elaboration can certainly strengthen the resulting mental links (Craik & Lockhart, 1972). Nevertheless, comprehension of externally provided propositional information may require more resources if this information is highly complex. The same is true for the self-generation of propositional information given that limited cognitive resources can constrain the complexity of self-generated information.

Controllability

Expression

Another important characteristic that has been used to describe associative processes is the notion of controllability. In technical terms, a process can be described as *uncontrollable* if it operates despite a person's intention to terminate that process. Thus, whereas the intentionality criterion refers to the goal of starting a process, the controllability criterion refers to the goal of altering or stopping a process (Bargh, 1994). Applied to the current question, one could argue that the activation of evaluative associations—and therefore of the affective gut reactions resulting from these association—is uncontrollable if this activation process cannot be altered or terminated. We argue that the activation of evaluative associations is controllable to some extent. However, the overall success in controlling the activation of evaluative associations is assumed to depend on the nature of the adopted control strategy. According to the APE model, the most critical factor in this regard is whether the adopted control strategy implies a negation of information that is already activated or an affirmation of new information. As outlined earlier, negating the validity of an affective gut reaction is assumed to reduce the influence of this reaction on evaluative judgments. However, it may not eliminate the affective gut reaction per se, as mere negations do not necessarily deactivate the associations that gave rise to this reaction. In contrast, affirming new evaluative information typically activates new associations in memory, which tend to influence the affective gut reactions resulting from activated associations in the intended direction.

As for propositional processes, we argue that the default process of affirming the validity of activated information is generally controllable, because activated information can always be negated. However, the process of monitoring the (in)consistency of activated information is most likely uncontrollable, in that it cannot be altered or stopped. The process of inconsistency resolution is generally controllable given that people may change the preferred strategy to resolve inconsistency. For example, instead of rejecting one of the involved propositions as false, a person may search for information that resolves the inconsistency (or vice versa). The behavioral process of reporting an evaluative judgment is generally controllable given that a person can always report a different judgment voluntarily.

Formation

In the APE model, we assume that associative learning is uncontrollable in the sense that observed contiguities can create mental links despite the goal of not forming an association between the relevant stimuli (e.g., Gawronski et al., in press). A more complex question is whether associative learning can be intentionally altered (rather than stopped). Several studies have shown that EC effects of repeated CS–US pairings can be reversed when the CSs were assumed to have a "negative" relation to the USs (e.g., the CS dislikes the US; the CS is an enemy of the US; see Fiedler & Unkelbach, 2011; Förderer & Unkelbach, 2012). Although these findings seem to suggest that associative learning can be altered by higher-order processing goals, there is evidence that reversed EC effects resulting from "negative" CS–US relations may conceal unqualified associative effects that can be uncovered under particular conditions. For example, Langer, Walther, Gawronski, and Blank (2009) presented participants with several CS–US pairs and additional information indicating that the two stimuli have either a positive relation (i.e., like each other) or a negative relation (i.e., dislike each other). Subsequently, the original valence of the USs was reversed, such that participants received negative information about positive USs and positive information about negative USs (see Walther et al., 2009). Participants in a control condition were presented with neutral information about the USs. Results in the control condition showed a standard EC effect when the CSs and the USs had a positive relation, but a reversed EC effect when the CSs and the USs had a negative relation (see also Fiedler & Unkelbach, 2011; Förderer & Unkelbach, 2012). More importantly, when the original valence of the USs was reversed, CS evaluations failed to produce the mirror image of the crossover interaction obtained in the control condition. Instead, there was only an unqualified main effect of US valence, such that CS evaluations directly reflected the new valence of the US that had been paired with a given CS regardless of whether the relation between the two stimuli was positive or negative. These results suggest that propositional inferences regarding "negative" CS–US relations can conceal associative effects to the extent that information about these relations is available during the encoding of CS–US pairings (for related findings, see Gawronski, Walther, & Blank, 2005). However, the same pairings simultaneously create an unqualified associative link between the CS and the US, which can be uncovered through subsequent revaluation of the USs.

As for the controllability of propositional learning, it is certainly possible to invalidate intentionally an externally provided or self-generated proposition. Such goal-dependent invalidation is conceptually equivalent to the effects of motivated reasoning, in which people may have a desire to confirm or disconfirm the validity of a given proposition. As with negation effects in motivated reasoning, however, the effectiveness of intentional invalidation is often limited to the propositional level, in that merely negating a particular proposition (i.e., reversing its truth value) is insufficient to deactivate the associative link underlying this proposition. The process of self-generating propositions can also be uncontrollable, in that such propositions may often be the "stimulus-driven" result of noticing a systematic relation between stimuli.

DUAL PROCESSES, DUAL SYSTEMS, OR DUAL REPRESENTATIONS?

The APE model is a dual-process theory in the sense that it distinguishes between two conceptually distinct processes on the basis of their operating principles. Whereas associative processes are defined as the *activation* of mental associations on the basis of feature similarity and spatiotemporal contiguity, propositional processes are defined as the *validation* of momentarily activated information on the basis of logical consistency. Deviating from this conceptualization, however, the APE model has sometimes been misinterpreted as a dual-system or dual-representation theory. Whereas dual-process theories limit their assumptions to the distinction between two kinds of mental processes (see Gawronski & Creighton, 2013), dual-system theories postulate systematic overlap between multiple distinct dualities (e.g., associative/automatic/experiential/holistic/slow-learning vs. propositional/controlled/rational/analytic/fast-learning) with the two categories of processes being supported by different mental or neural structures (e.g., Epstein, 1994; Kahneman, 2003; Lieberman, 2003; Sloman, 1996; Smith & DeCoster, 2000; Strack & Deutsch, 2004). A particular subset of dual-system theories is dual-representation theories, which propose the storage of two distinct memory representations of the same object (e.g., Rydell & McConnell, 2006; Wilson, Lindsey, & Schooler, 2000).

Although the APE model shares some assumptions with dual-system and dual-representation theories, it disagrees with both conceptualizations in fundamental ways (Gawronski & Bodenhausen, 2011). First, rejecting the notion of dual representations, the APE model does not assume a separate storage of associations and propositions in memory. Instead, all information is assumed to be stored in the form of associations, which may or may not pass a propositional assessment of validity. Second, the APE model does not assume systematic overlap between multiple distinct dualities, as proposed by dual-system theories. As we have outlined in detail in this chapter, we do not assume a one-to-one mapping between operating principles (associative vs. propositional) and operating conditions (automatic vs. controlled). We also do not assume systematic overlap of either distinction with other kinds of dualities (e.g., holistic vs. analytic, experiential vs. rational, slow-learning vs. fast-learning). Third, the APE model remains agnostic about whether associative and propositional processes are supported by distinct mental or neural structures. Although the notion of dual systems may provide useful links to basic concepts in neuroscience, we remain skeptical as to whether the brain can be meaningfully divided into two systems, considering that the brain includes multiple specialized regions that mutually interact with each other to produce a particular behavioral outcome. In fact, we doubt whether claiming that the two processes operate in two different systems provides any additional prediction over and above the ones that are already implied by the dual-process distinction.

An important issue in this context concerns the status of associations and propositions as mental entities. Although associative and propositional processes are conceptually distinct in the sense that they are characterized by nonoverlapping operating principles, a qualitative distinction between associations and propositions as conceptually distinct entities is more difficult to maintain (Gawronski & Bodenhausen, 2006b). According to the APE model, any association turns into a proposition if it is assigned a truth value. Conversely, any proposition depends on activated associations, because we do not propose an independent storage of propositions in memory. Thus, although the APE model distinguishes between associative and propositional processes as two conceptually distinct processes, the terms *association* and *proposition* should not be misinterpreted as implying two conceptually distinct mental entities.

Another important question in the context of memory representation concerns the storage of relational information. For example, the stimulus event *John is eating the sandwich* is inherently relational, in that it involves a clear structure between the actor (*John*), the described action (*eating*), and the object of the action (*sandwich*). Because associative memory has sometimes been described as being limited to unstructured, bidirectional links between concepts that do not include relational information (e.g., Lieberman, 2003), proponents of propositional models tend to reject the notion of associative memory on the grounds that memory representations are inherently relational (e.g., Mitchell et al., 2009). In response to this criticism, it is important to note that structural relations can certainly be accommodated in associative memory models that are based on distributed networks with multiple layers of excitatory and inhibitory links (Smith, 1996). Moreover, as we outlined earlier, the central distinction in the APE model is not between associative and propositional *representations*. Instead, we distinguish between associative and propositional *processes* on the basis of their nonoverlapping operating principles. Of course, any cognitive account has to accommodate the inherently relational structure of mental representation. However, this issue is fundamentally different from the dual-process distinction in the APE model, which defines associative and propositional processes in terms of their operating principles (i.e., activation vs. validation), not in terms of their underlying mental representations.

CONCLUSION

Our main goal in this chapter has been to explain how the distinction between associative and propositional processes relates to the distinction between automatic and controlled processes that has guided dual-process theorizing in the last three decades. We have argued that the associative–propositional distinction refers to what a given process is doing (*operating principles*), whereas the automatic–controlled distinction refers to empirical claims about when that process is operating (*operating conditions*). Although the two dichotomies are sometimes assumed to overlap, the APE model draws a sharp line between operating principles and operating conditions, in that both associative and propositional processes have automatic and controlled aspects. Although the APE model is primarily concerned with the role of associative and propositional processes in evaluation, its core assumptions are applicable to both evaluative and nonevaluative information, thereby providing the basis for a general theory of human thought.

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NOTES

1. Challenging the generality of such ironic effects, a recent study by Peters and Gawronski (2011b) found that negation can qualify the stored representations resulting from subjectively invalid propositions to the extent that the invalidation occurs within a sufficiently short interval after encoding. Nevertheless, there seem to be systematic limits in the processing of observed co-occurrences between stimuli that involve a contrastive relation (e.g., Moran & Bar-Anan, 2012).
2. In this context, it is important to distinguish between attention and awareness as two conceptually distinct aspects of encoding CS–US relations. Although attention to the relevant stimuli is likely required for both associative and propositional learning, associative learning may occur in the absence of conscious awareness to the extent that the relevant CS–US pairings are in the focus of attention (e.g., Custers & Aarts, 2011; Field & Moore, 2005).

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